



# Discussion paper

## **SECURITIZATION AND LENDING STANDARDS: EVIDENCE FROM THE WHOLESALE LOAN MARKET**

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# Securitization and lending standards: Evidence from the wholesale loan market<sup>\*</sup>

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# Securitization and lending standards: Evidence from the wholesale loan market

**Abstract:** We investigate the effect of securitization activity on banks' lending standards using evidence from pricing behavior on the syndicated loan market. We find that banks more active at originating asset-backed securities are also more aggressive on their loan pricing practices. This suggests that securitization activity lead to laxer credit standards. Macroeconomic factors also play a large role explaining the impact of securitization activity on bank lending standards: banks more active in the securitization markets loosened more aggressively their lending standards in the run up to the recent financial crisis but also tightened more strongly during the crisis period. As a continuum of this paper we are examining whether individual loans that are eventually securitized are priced more aggressively by using unique European data on individual loans from all major trustees.

## **Executive Summary**

In the wake of the largest financial crisis in recent times many causes have been put forward. In particular, securitization has been under scrutiny for fuelling credit growth by banks, possibly lowering credit standards and rendering the financial system more fragile to liquidity shocks. Traditional securitization can be broadly defined as the process whereby individual bank loans and other financial assets are bundled together into tradable securities, which are then sold on to investors. The development of the securitization market in the euro area started in the second half of 1990s and evolved to become a major funding instrument in the run up to the financial crisis. The advent of securitization changed banks' role and their incentives to take on new risks, in particular, via the possible impact of securitization on banks' screening incentives. In this regard, securitization could have undermined banks' lending standards.

In this paper we explore the link between securitization and lending standards by examining the pricing behavior of European banks involved in the securitization market when extending credit. Using evidence from the syndicated loan market, we specifically test if banks more active at originating asset-backed-securities, priced credit risk more aggressively when extending new loans (i.e. grant credit at lower yields). This approach has the advantage of examining banks' lending standards with first hand information from their primary activity of lending, while accounting for bank, borrower and instrument detailed conditions. This should, in turn, give an indication of banks' changes in their risk-taking profile.

We find that banks more active in originating securitised assets are also more inclined to relax (i.e. lower) their pricing of credit risk when extending new loans. The aggressiveness in pricing behaviour related to securitization is more noticeable for the smaller loans. Pricing standards also change over the business cycle: during an expansionary period, banks more active on funding via securitization are also more likely to relax their pricing standards probably relying on the possibility of offloading these loans through the financial markets. In this respect, banks priced credit risk very aggressively in the run up to the recent financial crisis. On the other hand, during an economic slowdown banks become more cautious on their pricing. Compared to their peers, banks more active in the securitization market during the 2007-2009 financial crisis were charging higher spread.

## 1. Introduction

In the wake of the largest financial crisis in recent times many causes have been proposed for the 2007-2009 financial crisis. At the centre of the argument is banks' excessive risk-taking behavior, especially through abundant lending, over-leveraging and dramatic expansion in the usage of credit transfer products in the years leading up to the crisis. Securitization, albeit not new to the banking business, has been under scrutiny too for fuelling credit growth by banks, lowering banks' credit standards and creating a false sense of diversification of risks (Shin, 2009).

Traditional securitization can be broadly defined as the process whereby individual bank loans and other financial assets are bundled together into tradable securities, which are then sold on to investors. In contrast to the US experience, where securitization in a narrow sense has been used as a technique for more than fifty years, the development of the securitization market in the euro area started much later and was not triggered by the introduction of any specific government agency.<sup>1</sup> The public euro-denominated securitization markets started timidly in the late 1990s, accelerated strongly from 2004 to 2007 and declined abruptly afterwards. Securitization activity in the euro area has also been large in terms of total credit securitized (see Figures 1.a and 1.b). In 2006, for instance, the annual net flow of euro-denominated asset-backed-securities (ABS) was above one-fifth of the bank loans granted to households and non-financial corporations during that year (Marques-Ibanez and Scheicher, 2010).

*<Insert Figure 1.a Euro-denominated securitization activity in Europe>*

*<Insert Figure 1.b Securitization and retained activity in the euro area>*

Rapid developments in securitization markets altered banks' role. Banks have long been recognized as "special" because of their ability to act as intermediaries between borrowers and depositors and transform illiquid assets into liquid deposit contracts.

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<sup>1</sup> In the United States the market for ABS started to develop by means of government-sponsored agencies such as the Federal National Mortgage Association, known as Fannie Mae, and the Federal Home Loan Mortgage Corporation or Freddie Mac, created in 1938 and 1968, respectively. These agencies enhanced mortgage loan liquidity by issuing and guaranteeing, but not originating, ABS.

Conventionally, bank lending was typically conducted on the basis of a bank extending a loan to a borrower, holding the loan on their balance sheet until maturity and monitoring the borrower's performance along the way. In this relationship-based model, banks reduced idiosyncratic risks mainly through portfolio diversification and performed the role of delegated monitors on behalf of less informed investors (Diamond, 1984, Ramakrishnan and Thakor, 1984, Bhattacharya and Chiesa, 1995, Holmstrom and Tirole, 1997).

Securitization allowed banks to turn traditionally illiquid claims (overwhelmingly in the form of bank loans) into marketable securities. The development of securitization has allowed banks to off-load part of their credit exposure to outside investors thereby lowering regulatory pressures on capital requirements, raise new funds and increase lending further. Overall the advent of securitization changed banks' role dramatically from traditional relationship-based lending to originators and distributors of loans and had implications on bank's incentives to take on new risks.

Prior to the recent global financial crisis, the usual view at the time emphasized the positive role played by securitization in dispersing credit risk thereby enhancing the resilience of the financial system (Shin, 2009). Alan Greenspan (2005) highlighted that the use of credit risk transfer instruments enabled the largest and most sophisticated banks to divest themselves of credit risk by passing it to institutions with far less leverage. As a result, it was expected that securitization activity would make the financial system more stable as risk is diversified, managed and allocated economy-wide. From the perspective of individual institutions securitization was expected to be employed by banks to manage their credit risk more effectively. Even if the total risk remained within the banking sector, securitization was expected to allow banks to hold less risk simply due to diversification and more tradability (Duffie, 2008).

In this direction, early empirical evidence found a positive effect of securitization on banks' risk levels. Banks more active in the securitization market were also found to have lower solvency risk and higher profitability (Duffee and Zhou, 2001, Cebenoyan and Strahan, 2004, Jiangli, Pritsker and Raupach, 2007).

At the same time there were concerns regarding the possible impact of securitization on the screening and monitoring incentives of banks. In particular for those - legacy - loans which were no longer on the balance sheet of the originated bank but were passed through to outside investors. Mostly building on this argument, there was a more skeptical view on the benefits of securitization and its possible negative impact on the stability of the financial system.<sup>2</sup> It was argued that securitization does not necessarily lead to credit risk diversification, but could promote the retention of risky loans and undermine banks' monitoring incentives (Greenbaum and Thankor, 1987; Gorton and Pennacchi, 1995; DeMarzo, 2005; Instefjord, 2005; Morrison, 2005; Krahnen and Wilde, 2006; Parlour and Guillaume, 2008; Chiesa, 2008; Shin, 2009). A related view argues that by making illiquid loans liquid securitization could enhance, other things being equal, banks' risk appetite (Calem and LaCour, 2003; Ambrose et al., 2005; Hansel and Krahnen, 2007; Wagner, 2007; Brunnermeier and Sannikov, 2009).

We explore the link between securitization and lending standards by examining the pricing behavior of European banks involved in the securitization market when extending credit. We turn to evidence from the syndicated loan market<sup>3</sup> and specifically test if banks more active in the securitization market price credit risk more aggressively (i.e. grant credit at lower yields). This approach has the advantage of examining banks' lending standards with first hand information from their primary activity of lending, taking into account bank, borrower and instrument conditions. This, in turn, gives an indication of banks' changes in risk taking appetite. On top of the results presented in this study, we are currently expanding the scope of the paper. Namely we are collecting deal level information from European trustees which

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<sup>2</sup> Financial stability is defined as a condition in which the financial system – which comprises financial intermediaries, markets and market infrastructures – is capable of withstanding shocks and the unraveling of financial imbalances (ECB 2010). From this perspective if securitization activity leads to excessively lax lending standards by banks' it could have an impact on the overall financial stability by building up imbalances on credit markets that can make the overall system more fragile.

<sup>3</sup> Syndicated lending, where two or more banks agree jointly to make a loan, has evolved into one of the world's largest financial markets. In 2007, \$3.4 trillion were raised using this instrument, amounting to one third of all funds raised internationally, including bond and equity issuance. In a typical syndicated loan, "arranger" (or "senior") banks are situated at the core of the process. They help to put together the deal at a given set of terms and sell parts of the loan to "participant" (or "junior") second tier banks, as well as other investors, assigning some of the loan to themselves. Participant banks do not normally negotiate directly with the borrowing firm, but rather have an "arm's-length" relationship acting through the arranger (Sufi, 2007). The composition and structure of the syndicate can have an influence on loan pricing. In a bilateral loan the price is determined by a single lender depending on its information set about the risk of the borrower and the loan terms and conditions. In syndicated lending, the price of the loan is determined by negotiations between the arranger and the participant banks.

allow us to distinguishing those syndicated loan deals that were eventually securitized. Using this data we aim to examine further whether securitized loans are priced more aggressively by banks.

We utilize a set of four alternative variables to proxy for securitization activity at the bank level. Subsequently, we match this bank level information with deal level data from the syndicated loan market amounting to 20,830 syndicated loan deals/bank matched observations. We gauge the impact of European banks' securitization activity on loan spreads by controlling for other factors such as bank characteristics, loan terms and purpose, borrower credit quality and business sector as well as the macroeconomic environment.

The remainder of the paper is organized as follows: Section 2 reviews the related literature on the effects of securitization on lending standards and risk-taking behavior. Section 3 describes the data sources, provides descriptive statistics and explains the empirical methodology used in the analysis. The results of estimations are presented and discussed in Section 4. Section 5 concludes.

## **2. Literature review**

Securitization has significantly changed the liquidity transformation role traditionally performed by banks. The changing role of banks from "originate and hold" to "originate, repackage and sell" has made large parts of previously illiquid loans potentially liquid. Prior to the 2007-2009 financial crisis, the overall view was that securitization lead to an overall improvement of financial stability by smoothing out the risks among many investors (Duffie, 2008). Scant early empirical evidence also went in this direction. For instance Cebenoyan and Strahan (2004) find that through loan sales banks improve their ability to manage credit risk while Jiangli and Pritsker (2008) argue that securitization increase bank profitability and leverage while reducing overall insolvency risk.

The crisis has shown, however, that the securitization market is heavily dependent on markets' perceptions. It could be subject, as a result, to sudden illiquidity concerns from investors leading to acute liquidity crises with significant macroeconomic implications.



The theory of financial intermediation has placed special emphasis on the role of banks in monitoring and screening borrowers thereby mitigating moral hazard between borrowers and lenders (Diamond, 1984; Fama 1985; Boyd and Prescott, 1986). By creating distance between the loan's originator and the bearer of the loan's default risk, securitization can potentially reduce lenders' incentives to carefully screen and monitor borrowers (Petersen and Rajan, 2002). As a result some researchers associate loan sales and securitization to looser credit monitoring incentives by banks' (Gorton and Pennacchi, 1995; Duffee and Zhou, 2001; Morrison, 2005; Chiesa, 2008).

Initial empirical evidence from the recent crisis vouches for these results. Banks' spectacular resort to securitization activity in the years preceding the crisis produced an overall loosening in lending standards (Keys et al., 2008). For example Dell'Ariccia, Igan, and Laeven (2008) link the current sub-prime mortgage crises to a sharp decline in lending standards in the United States. This decline was more intensive in areas where mortgage securitization was relatively more prevalent. Supporting these findings, Mian and Sufi (2009) showed that securitization drove the relative decline in the quality of mortgage credit.

In order to signal the quality of the securitized assets and align its interests with those of investors, the originator of the assets may retain part of the equity tranche on its balance sheet. The objective is to lower asymmetries of information between originators and the final investor via the retention of the lowest ranked (e.g. equity) tranche. This retention, generally seen in practice, is the result of a signaling equilibrium where the securitizing bank, in an attempt to signal the value of assets, retains poorer quality assets (DeMarzo, 2005; Greenbaum and Thankor, 1987; Instefjord, 2005). Holders of senior tranches are exposed to sizable "tail risk", i.e. the risk of very infrequent but catastrophic losses (Coval et al., 2009).

Securitization also has a direct positive impact on the quantity of loans supplied by banks. Loutskina (2010) and Loutskina and Strahan (2009) find that securitization reduces banks' holdings of liquid securities and increases their lending ability. Hirtle (2008) provides evidence that greater use of credit derivatives is associated with greater supply of bank credit for large term loans, with longer maturity and lower spreads, for newly negotiated loan extensions to large corporate borrowers. For Europe Altunbas et al. (2009) conclude that banks active in the securitization market also seem to supply more loans.

While risk sharing within the financial sector (through securitization and derivatives contracts) reduces a number of market inefficiencies, it can also amplify bank risks also at the systemic level (Brunnermeier and Sannikov, 2010). Allen and Carletti (2007) show that credit risk transfer could produce a reduction in welfare due to contagion. Wagner (2007) shows that the increase in liquidity of bank assets achieved through securitization, paradoxically, increases banking instability and the externalities associated with banking failures as banks have stronger incentives to take on new risks. The reason is that securitization makes crises less costly for banks and, as a result, they have an incentive to take on new risks offsetting the positive direct impact of securitization on bank stability. In sum, this strand of the literature argues that securitization does not necessarily lead to unlimited risk transfer but that it promotes retention of risky loans and undermines banks' screening incentives. As a result, it may weaken financial stability.

Part of the most recent empirical literature considers whether securitization activity makes further acquisition of risk more attractive for banks. In this direction, Krahnen and Wilde (2006) report an increase in the systemic risk of banks, after a securitization deal takes place, due to the retention of the first loss piece. Michalak and Uhde (2009) provide empirical evidence that credit risk securitization has a negative impact on banks' financial soundness in Europe. Insterjord (2005) highlights that when a bank has access to a richer set of tools to manage risk than in the past; it acquires new risks more aggressively in. In this direction also, Hansel and Krahnen (2007) find that activity in the European CDO market enhances the risk appetite of the originating bank.

Enhancement of risk appetite is also related to regulatory capital arbitrage. Securitization has often been used by banks to lower their regulatory needs for costly capital charges on their credit book (Watson and Carter, 2006). Through securitization banks can potentially increase regulatory capital adequacy ratios without decreasing their loan portfolios' risk exposure. In other words, banks may securitize less risky loans and keep the riskier ones. Ambrose et al. (2005) show that securitized loans have experienced lower ex-post defaults than those retained on banks' balance sheet.

### 3. Methodology and data

We analyze the link between securitization activity and lending standards. For each time period we consider banks' securitization activity and then turn to evidence from the syndicated loan market and observe the price setting for each bank on newly extended loans (measured as the spread charged) as a measure of banks' risk appetite. In other words, we examine if banks that securitize the most were more aggressive in their loans pricing. This allows us to investigate if banks active in the securitization market exhibited a laxer approach on the pricing of credit risk.

In addition to the above we are currently extending the scope of our analysis. We will expand it by including deal level information on which syndicated loans were eventually securitized. This is done by means of a unique database constructed by collecting deal-by-deal information from all European trustees. This expansion of the data and analysis allow us to expand on the link between bank risk taking and securitization activity in an additional dimension as it will be possible to examine whether the loans which are eventually securitized are priced more aggressively than those that are not securitized.

Our model explains *loan spreads* as a function of several factors (Carey and Nini, 2007; and Ivashina, 2009). Where *Loan spread* is measured as the spread on basis points over LIBOR. We use the all-in drawn spread (*AIDS*) which measures the interest rate spread plus any associated fees included at loan origination.<sup>4</sup> Thus, *AIDS* is an all-inclusive measure of loan price which is expected to depend on borrowers, loan and macroeconomic characteristics as well as a variable accounting for the intensity of securitization activity (see below).

$$\begin{aligned}
 \text{loan spread}_{i,t} = & \beta_0 + \beta_1 \sum_{s=1}^S \text{Securitization}_{s,t} + \sum_{c=1}^C \beta_c * \text{Bank characteristics}_{c,i} + \sum_{t=1}^{T-1} \beta_t * \text{Loan terms}_{t,i} + \\
 & \sum_{s=1}^{S-1} \beta_s * \text{Loan purpose}_s + \sum_{k=1}^{k-1} \beta_k * \text{Borrower credit quality}_k + \sum_{b=1}^{B-1} \beta_b * \text{Borrower Sector}_B \\
 & + \sum_{y=1}^{Y-1} \beta_y * \text{Year}_y + e_{i,t}
 \end{aligned} \tag{1}$$

We utilize a set of different variables to account for securitization activity by banks:

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<sup>4</sup> See Bharath et al. (2010); Ivashina (2009) and Sufi (2007).

1. *Sec\_dum* takes the value of 1 if the bank *i* securitized any assets on the year *t* in which the loan *i* is syndicated and 0 otherwise. *Sec\_dum* measures the immediate impact of bank's securitization activity on loan pricing.
2. *Sec\_dum\_all* takes the value of 1 if the bank *i* was active in the securitization market anytime between 1994 and 2008 and 0 otherwise. This variable serves to test whether, in general, banks that were more active in the securitization market priced loans more aggressively than others.
3. *Sec\_rel* is the size of total securitization activity by bank *i* on the year when the loan is syndicated divided by its total assets. *Sec\_rel* measures the immediate impact of securitization activity on loan pricing in relation to the bank's securitization activity within each year *t*.
4. *Sec\_rel\_tot* is the total size of each bank *i* total securitization activity between 1994 and 2008 divided by its average assets during this period. This measure aims to capture bank's securitization activity over the whole sample period.
5. *Loan\_to\_sec* is calculated as the total amount of syndicated loans by bank *i* in period *t* divided by the overall amount of bank's securitization activity within that year.

We account for *characteristics* of bank *i* that might affect the pricing behavior by taking into account bank size (measured as the natural logarithm of total assets)<sup>5</sup>, bank capital (measured as the ratio of equity capital to total assets), banks' portfolio quality (calculated as *loan loss provision to total loans*), banks' profitability (*return on assets*), relative size of the loan portfolio (*net loans to total assets*), liquidity (*liquid assets to total assets*) and income diversification (*other non-interest income to total income*). Banks with higher capital ratios, better portfolio quality, higher profitability and a larger, diversified loan portfolio are expected to charge lower prices. Direction of other bank characteristic variables is ambiguous.

We also control for factors related to the terms of the loan deal (i.e. *loan terms*) including loan size, maturity and the presence of guarantees and collateral. *Loan size* is measured as the natural logarithm of the syndicated loan's size. *Maturity* is the duration of the

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<sup>5</sup> Banks and loan size are the only variables in the model that measured with actual size. As the size of banks and loans vary substantially, we use the natural logarithm of these variables to capture the relative impact on loan price.

loan in years and measured by three dummy variables accounting for short-term (less than 3 years), medium-term (between 3 and 6 years) and long-term (over 6 years) loans. *Guarantee* is a dummy variable taking the value of 1 if the loan is guaranteed and 0 otherwise. *Collateral* is a dummy variable taking the value of 1 if there is any collateral pledged for the loan and 0 otherwise. Loan size and maturity are expected to have a positive relationship with loan spreads. The expected sign for guarantees and collateral is ambiguous.

*Loan purpose* is a set of dummy variables depending on the purpose of the loan which can be classified as general corporate use, capital structure, project finance, transport finance, corporate control and property finance.

We also account for *borrower credit quality*, and *borrower sector* via a set of dummy variables reflecting the credit rating (AAA, AA, A, BBB, BB, BB, CCC, CC, C or not rated) of the borrower issued by the credit agencies (Moody's, Standard and Poor's or Fitch) at the time of issuance. Higher quality borrowers are expected to pay lower spreads for loans.

*Borrower sector* is a set of dummy variables related to the main business of the borrower (i.e. construction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport).

We also control for the macro environment including *Year* dummies.<sup>6</sup> Our data covers the period ranging from 1994 to 2008.

### 3.1 Data sources

We construct our dataset by combining data from three different sources. Securitization data are obtained from Dealogic (Bondware) which is a private commercial data provider and completed with data from Standard and Poor's (S&P), a large private rating agency. We look at individual deal-by-deal issuance patterns from euro-area banks originating the securities. The advantage of using data on securitization activity from Bondware and S&P is that the name of the originator, the date of issuance and deal proceeds are registered. We include funded public Asset-backed securities as well as cash-flow (balance-sheet) *CDOs* issued by euro-area originators. Overall the securitization dataset covers over 4,500 tranches.

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<sup>6</sup> A correlation matrix is presented in Table 8.

Data on syndicated loan deals are also obtained from Dealogic (Loanware), a commercial database which contains detailed information on syndicated loan contracts. Dealogic provides detailed information for each loan including maturity, loan size, collateral, presence of guarantees, loan purpose as well as the identification of the borrower and banks involved in the syndicate. The database also provides the business sector of the borrower and the credit rating attached to the issued instrument. Finally, bank balance-sheet and income statement information are obtained via Bankscope, a commercial database maintained by Bureau van Dijk.

In constructing the dataset, we include all syndicated loans for which the main control variables on loan terms and borrower details are present. Secondly we extract the names of the European banks participating on these loan syndicates. This information is manually matched with Bankscope using the names of the parent institutions to extract information on the financial balance sheet characteristics of each bank on a yearly basis. We then match each syndicated loan deal with each participant banks' financial information on a yearly basis. Subsequently, again via the name of each participating bank, we obtain the amount of securitization activity originated yearly for each bank from our sample on securitization activity at the deal level from Dealogic (Bondware)/Standard and Poor's. For example if *Loan i* is granted by *Bank X*, *Bank Y* and *Bank Z* in 2007 and *Loan j* is granted by *Bank X* and *Bank Q* in 2008 then these combinations of loans and banks are matched as follows:

*Loan i's terms and borrower's data for 2007 + Bank X's data for 2007*  
*Loan i's terms and borrower's data for 2007 + Bank Y's data for 2007*  
*Loan i's terms and borrower's data for 2007 + Bank Z's data for 2007*  
*Loan j's terms and borrower's data for 2008 + Bank X's data for 2008*  
*Loan j's terms and borrower's data for 2008 + Bank Q's data for 2008*

Overall this process generates 20,830 deal-matched observations. As the different data sources do not have a unique identifier to match the three databases, all the data is hand-matched by the bank names of the parent institution. We present a summary descriptive statistics related to the sample in Table 1.

## 4. Results

The results of the basic model are presented in Table 2. We employ separately the four securitization activity variables in alternative models (Model I-IV). Across all the models we find consistent and significant evidence suggesting that securitization activity is negatively related to loan spreads. The coefficient of *sec\_dum* suggests that banks charge lower spreads if they securitized some assets in the same year in which the loan is issued. Findings for *sec\_dum\_all* also confirm that when banks are active in the securitization market, at least once during our period of study, they tend to price the credit risk more aggressively. The coefficients of the two continuous variables accounting for securitization, *sec\_rel* and *sec\_rel\_total*, display the same relationship as the two previous (dummy) variables but with higher impact stressing the strength of the relationship. The coefficient of *sec\_rel*, which measures the relative size of the securitized assets to total assets, is larger than the previous two variables. This reinforces the argument of securitization activity being linked to laxer credit standards by banks. Banks securitizing more assets tend to under-price even further when they extend new loans, perhaps with the confidence of knowing that the loans can be sold in the securitization market afterwards.

### 4.1 Bank and loan size effects

We control for banks' size as larger banks might be able to diversify or manage their credit risk exposure better or simply because very large banks might be deemed as 'too big to fail' and therefore they might have incentives to take on additional risks. Hence we divide our sample into two groups according to size defined as *large* and *small* banks. *Small banks* are smaller than (or equal to) the median bank size (measured by total assets) and we classify as *large banks* those banks larger than the median bank in terms of size of their balance sheet. Results are displayed in Table 3. For each group, we separately re-run the previous models incorporating the different indicators accounting for securitization activity (small banks - Models I to IV and large banks - Models V to VIII). For small banks none of the coefficients accounting for securitization activity are significant. In contrast, for large banks they are all consistently significant and negatively associated with the loan spread. Furthermore, the coefficients are larger than the results for the basic model, particularly for *sec\_rel* (in Table 2). The findings

show that larger banks heavily involved in the securitization activity are those more likely to relax their price standards on wholesale loans.

We further test whether the relaxation in lending standards due to securitization varies according to the size of the loan. We divide the sample into two groups defined as *large* and *small loans*. *Small loans* are those classified as smaller than (or equal to) the size of the median loan and *large loans* are classified as those loans larger in size than the median loan for each given year. All models (See Table 4, Model I to VIII) report a significant and negative estimate for all the coefficients of the securitization proxies suggesting that loan size does not seem to make a difference on the signs of the coefficients relating pricing behavior to securitization. The sizes of the coefficients are however higher for smaller loans providing some evidence that, banks under-price smaller loans by more as they are probably more subject to asymmetries of information. In Model IX (Table 4), we employ both the size of loan relative to the size of banks total securitization activity (*loan\_to\_sec*) as well as the securitization activity dummy *sec\_dum*, to further scrutinize the effect of loan size. The results support earlier evidence suggesting that larger loans (in relation to total securitization) are less likely to be under priced.

As large banks are more likely to price more aggressively, we go one step further and focus only on large banks and observe if their behavior changes depending on loan size (Table 5). Again the securitization variables suggest an impact on loan price which is statistically significant across all models. However, we report significantly higher coefficients for smaller loans (Models I to IV in Table 5). Banks active in the securitization market charge lower spreads to smaller loans than to larger ones.

#### **4.2 Business cycle and risk taking**

We also consider whether the link between pricing behavior and securitization activities changes over the business cycle as lending standards probably change with macroeconomic conditions. In addition the impact of securitization on lending standards might change according to investors demand for securitized products and this demand is expected to be stronger during periods of economic growth (Demyanyk and Van Hemert, 2008). To carry the analysis further, we divide the sample into four different periods according to macroeconomic



conditions in Europe. We define the 1997-1999 and 2003-2006 as growth periods and the 2000-2002 and 2007-2008 as slowdown periods. It is particularly important to observe bank behavior for the period prior to the recent credit crisis since banks increased their risk-taking behavior in many fronts, especially lowering their lending standards coinciding with increases in securitization activity in the years leading up to the crisis (Maddaloni and Peydro, 2010). Results are presented in Table 6.

#### 4.2.1 *Growth periods*

For both of the growth periods we report negative and statistically significant coefficients across all models using alternative securitization activity proxies. The results indicate that during expansionary period banks are more likely to under-price credit risk possibly linked to declines in risk aversion which coincided with periods of better economic prospects. Furthermore, coefficients for the variable *sec\_rel* for both periods show that under-pricing is amplified when the value of securitized assets is larger. A notable difference between the two expansionary periods is the size of the coefficients of the securitization variables, which is much larger for the 2003-2006 period which was a period of historical growth of securitization markets in Europe. This signals that banks, probably relying on the possibility of future securitization, lowered their lending standards much more aggressively for the period prior to the 2007-2009 financial crisis than they did on the period preceding the previous economic slowdown (2001-2002). The difference among the two periods is consistent with the development of the securitization market in the second one. The activity in the securitization market was moderate in Europe between 1997 and 1999 and not many banks were utilizing this market for offloading assets. However, after the economic slowdown of 2001-2002 public securitization activity soared and peaked towards the end of 2006. At the time, banks became more reliant on securitization of assets and probably under-priced loans with the confidence that loans can be sold to others in the securitization market.

#### 4.2.2 *Economic slowdown and 2007-2008 period of financial crisis*

The results are substantially diverse for the previous economic slowdown compared to the most recent crisis period. Firstly we find that, apart from *sec\_dum\_all*, the securitization activity

variables are not significant for the 2000-2002 slowdown period. This is a period of overall tightening in credit standards (Ivashina and Scharfstein, 2010). During an economic slowdown, banks, facing increases in non-performing loans and write-offs, keep a tight control and are overall more cautious on their lending practices. During this period there is no evidence suggesting that banks involved in securitization activity relaxed credit standards by more probably because securitization market's activity declined during this recession period.

Findings for the recent 2007-2009 financial crisis are striking as compared with previous results we find a reverse relationship between securitization activity and lending standards. The *sec\_dum* and *sec\_rel* variables (which proxy the current securitization activity) are, unlike all other coefficients reported above, positively related to the loan price. These results point out that securitization seems to make lending standards more cyclical. In other words, in periods of slow economic growth in which demand for securitization from investors is subdued, banks active in the securitization market were charging higher spread for the loans they were extending thereby reverting the trend seen in periods of buoyant economic growth.

#### **4.3 Robustness checks for existence of credit rating**

Due to data limitations we cannot control for credit ratings for all borrowers. In this final section we check whether the basic results hold for those borrowers with and without credit ratings. The results are presented in Table 7. We find that the basic findings of the paper are consistent and that the main relationships hold for all securitization activity proxies.

### **5. Conclusions**

Securitization has been under the scrutiny for possibly fuelling credit by lowering credit standards leading to increased banks' and borrowers' leverage (Farhi and Tirole, 2009 and Shin, 2009). We explore the nexus between securitization and bank risk-taking by examining the pricing behavior of European banks when extending new loans after securitization. We use a wide sample of 20,830 matched bank-loan observations to gauge the impact of European banks' securitization activity on loan spreads after controlling for lender, borrower and loan characteristics.

We consistently find that banks more active in securitization markets are more inclined to under-price the credit risk when extending new loans. The risk-taking behavior is more

apparent in larger banks. That is the under-pricing intensifies for large institutions heavily involved in securitization activity. We also find that smaller loans are more likely to be under-priced than larger ones.

The pricing behavior also changes in relation to the business cycle. We find that during an expansionary period securitizing banks are more likely to price credit risk aggressively probably relying on expectations of their potential offloading of assets through securitization markets. This factor is amplified when the value of securitization activity as a percentage of banks' total assets is large. Banks priced credit risk much more aggressively for the period prior to the 2007-2009 financial crisis than they did for the period preceding the 2001-2002 economic slowdown which can be probably linked to the fast development of securitization in the latter period. On the other hand, during an economic slowdown banks (facing increases of non-performing loans and write-offs) tend to tight their lending standards. Banks, aware of a fall of investor interest in securitized assets during a recession, reduce their reliance on securitization markets and stop under-pricing credit risk. In fact, compared to their peers, banks active in the securitization market during the 2007-2009 financial crisis were charging higher spreads for the loans they were extending.

From a policy perspective, an important implication is that that securitization could be increasing the cyclicity of credit. Our results suggest that banks more active in securitization activity relaxed credit standards above their peers during periods of economic expansion. Securitization could therefore be fuelling, under certain circumstances, excessive loan growth which could potentially have financial stability implications. Policy measures aiming at smoothing the credit cycle could be beneficial in this respect. More generally, regulatory actions improving the incentive structure within the securitization market that reduces the incentives for under pricing credit risk are also warranted.

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**Table 1**  
**Descriptive statistics**

This table presents descriptive statistics. *Sec\_dum* takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. *Sec\_dum\_all* takes the value of 1 if the bank was active in the securitization market anytime between 1994 and 2008 and 0 other. *Sec\_rel* is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. *Sec\_rel\_tot* is the size of banks total abs activity between 1994 and 2008 divided by average assets during this period. *Loan\_to\_sec* is the size of the loan divided by the size of banks total abs activity in the year where the loan is syndicated.

**Securitization variables**

	<i># of obs.</i>	<i>= 1</i>	<i>= 0</i>	
<i>Sec_dum</i>	20,830	527	20,303	
<i>Sec_dum_all</i>	20,830	2588	18,242	
	<i># of obs.</i>	<i>&gt; 0</i>	<i>0</i>	<i>mean</i>
<i>Sec_rel</i>	20,830	527	20,303	0.67
<i>Sec_rel_tot</i>	20,830	2588	18,242	0.86
<i>Loan_to_sec</i>	20,830	527	20,303	2.34

**Distribution of observations over time**

<i>Year</i>	<i>% of sec_dum</i>	<i>% of sec_dum_all</i>
1994	0.0%	20.7%
1995	0.0%	21.2%
1996	0.0%	22.0%
1997	1.7%	22.0%
1998	0.0%	21.1%
1999	13.9%	23.9%
2000	3.3%	34.2%
2001	4.5%	9.0%
2002	4.3%	25.4%
2003	5.2%	15.8%
2004	5.2%	12.5%
2005	1.4%	7.8%
2006	1.4%	6.3%
2007	2.8%	5.9%
2008	0.6%	3.9%

**Table 1 (cont.)**  
**Descriptive statistics**

<b>Bank characteristics</b>				
	<i># of banks</i>	<i>mean</i>	<i>median</i>	<i>std. dev</i>
<i>Bank size (million USD)</i>	496	18,240	3,206	48,573
<i>Equity capital to total assets</i>	496	8.2	6.0	8.5
<i>Loan loss provision to total loans</i>	496	2.4	0.7	9.7
<i>Return on assets</i>	496	0.49	0.37	1.01
<i>Net loans to total assets</i>	496	38.9	37.2	22.3
<i>Liquid assets to total assets</i>	496	55.3	55.4	22.9
<i>Other income to total income</i>	496	13.9	10.7	18.0

<b>Loan characteristics</b>				
	<i># of loans</i>	<i>mean</i>	<i>median</i>	<i>std. dev</i>
<i>Spread (basis points over Libor)</i>	9,741	143	100	124
<i>Loan size (million USD)</i>	9,741	526	165	2261
<i>Maturity (years)</i>	9,741	4.34	5	4.50
	<i># of loans</i>	<i>= 1</i>	<i>= 0</i>	
<i>Presence of guarantees</i>	9,741	868	8873	
<i>Presence of collateral</i>	9,741	2614	7127	



**Table 2**

**Securitization activity and loan spreads**

**Impact on loan spreads (basis points of All in Drawn Spread )**

This table presents coefficient estimates for OLS regressions estimating the impact of bank securitization activity on the price of syndicated loans. *Sec\_dum* takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. *Sec\_dum\_all* takes the value of 1 if the bank was active in the securitization market anytime between 1994 and 2008 and 0 other. *Sec\_rel* is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. *Sec\_rel\_tot* is the size of banks total abs activity between 1994 and 2008 divided by average assets during this period.

	Model I	Model II	Model III	Model IV
<i>Sec_dum</i>	-16.93*** (3.50)			
<i>Sec_dum_all</i>		-14.31*** (1.66)		
<i>Sec_rel</i>			-27.82*** (6.17)	
<i>Sec_rel_tot</i>				-17.45*** (2.71)
Number of obs.	20,830	20,830	20,830	20,830
R <sup>2</sup>	35%	35%	35%	35%
<b>Control Variables<sup>‡</sup></b>				
Bank characteristics				
1. Log bank size				
2. Equity capital to total assets				
3. Loan loss provision to total loans				
4. Return on assets				
5. Net loans to total assets				
6. Liquid assets to total assets				
7. Other income to total income				
Loan terms and purpose				
8. Log loan size				
9. Maturity				
10. Presence of guarantees				
11. Presence of collateral				
12. Loan purpose – general corporate use, capital structure, project finance, transport finance, corporate control and property finance.				
Borrower credit quality and business sector				
13. Credit rating – AAA, AA, A, BBB, BB, BB, CCC, CC, C, and not rated.				
14. Business Sector – contraction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport.				
Macroeconomic controls				
15. Year fixed effects – 1994 to 2008				

Notes: Robust standard errors are reported in parenthesis

\*\*\*, \*\* and \* represents significance levels at 1%, 5% and 10%, respectively

<sup>‡</sup> Coefficients are not reported and available upon request

**Table 3**  
**Securitization activity and loan spreads by banks size**

<b>Impact on loan spreads (basis points of All in Drawn Spread )</b>								
This table presents coefficient estimates for OLS regressions estimating the impact of bank securitization activity on the price of syndicated loans by bank size. <i>Sec_dum</i> takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. <i>Sec_dum_all</i> takes the value of 1 if the bank was active in the securitization market anytime between 1994 and 2008 and 0 other. <i>Sec_rel</i> is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. <i>Sec_rel_tot</i> is the size of banks total abs activity between 1994 and 2008 divided by average assets during this period. Small banks are classified as banks smaller than (or equal to) the median bank size (measured by total assets). Large banks classified as banks larger than the median bank size (measured by total assets). <i>Sec_dum</i> equals to 1 in 170 observations for the small banks and in 355 observations for the large banks.								
	Small banks				Large banks			
	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
<i>Sec_dum</i>	3.93 (6.88)				-28.09*** (4.10)			
<i>Sec_dum_all</i>		1.48 (3.71)				-21.14*** (2.06)		
<i>Sec_rel</i>			-2.27 (8.79)				-60.12*** (8.52)	
<i>Sec_rel_tot</i>				3.61 (4.09)				-39.35*** (3.87)
Num. of obs.	8,337	8,337	8,337	8,337	12,493	12,493	12,493	12,493
R <sup>2</sup>	32%	32%	32%	32%	39%	39%	39%	39%
<b>Control Variables<sup>‡</sup></b>								
Bank characteristics								
1. Log bank size								
2. Equity capital to total assets								
3. Loan loss provision to total loans								
4. Return on assets								
5. Net loans to total assets								
6. Liquid assets to total assets								
7. Other income to total income								
Loan terms and purpose								
8. Log loan size								
9. Maturity								
10. Presence of guarantees								
11. Presence of collateral								
12. Loan purpose – general corporate use, capital structure, project finance, transport finance, corporate control and property finance.								
Borrower credit quality and business sector								
13. Credit rating – AAA, AA, A, BBB, BB, BB, CCC, CC, C, and not rated.								
14. Business Sector – contraction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport.								
Macroeconomic controls								
15. Year fixed effects – 1994 to 2008								

Notes: Robust standard errors are reported in parenthesis

\*\*\*, \*\* and \* represents significance levels at 1%, 5% and 10%, respectively

<sup>‡</sup> Coefficients are not reported and available upon request

**Table 4**  
**Securitization activity and loan spreads by loan size**

**Impact on loan spreads (basis points of All in Drawn Spread )**

This table presents coefficient estimates for OLS regressions estimating the impact of bank securitization activity on the price of syndicated loans by loan size. *Sec\_dum* takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. *Loan\_to\_sec* is the size of loan divided by the size of banks total abs activity in the year where the loan is syndicated. *Sec\_dum\_all* takes the value of 1 if the bank was active in the securitization market anytime between 1994 and 2008 and 0 other. *Sec\_rel* is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. *Sec\_rel\_tot* is the size of banks total abs activity between 1994 and 2008 divided by average assets during this period. Small loans classified as loans smaller than (or equal to) the median loan size. Large loans classified as loans larger than the median loan size.

	Small Loans				Large loans				All loans
	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII	Model IX
<i>Sec_dum</i>	-21.45*** (6.43)				-14.93*** (3.14)				-19.17*** (3.62)
<i>Sec_dum_all</i>		-19.70*** (3.01)				-12.12*** (1.65)			
<i>Sec_rel</i>			-38.39*** (11.98)				-22.95*** (6.26)		
<i>Sec_rel_tot</i>				-19.32*** (4.51)				-18.73*** (2.77)	
<i>Loan_to_sec</i>									0.75*** (0.19)
N. of obs.	10,826	10,826	10,826	10,826	10,004	10,004	10,004	10,004	20,830
R <sup>2</sup>	29%	29%	29%	29%	39%	39%	39%	39%	35%

**Control Variables<sup>‡</sup>**

**Bank characteristics**

1. Log bank size
2. Equity capital to total assets
3. Loan loss provision to total loans
4. Return on assets
5. Net loans to total assets
6. Liquid assets to total assets
7. Other income to total income

**Loan terms and purpose**

8. Log loan size
9. Maturity
10. Presence of guarantees
11. Presence of collateral
12. Loan purpose – general corporate use, capital structure, project finance, transport finance, corporate control and property finance.

**Borrower credit quality and business sector**

13. Credit rating – AAA, AA, A, BBB, BB, BB, CCC, CC, C, and not rated.
14. Business Sector – contraction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport.

**Macroeconomic controls**

15. Year fixed effects – 1994 to 2008

Notes: Robust standard errors are reported in parenthesis

\*\*\*, \*\* and \* represents significance levels at 1%, 5% and 10%, respectively

<sup>‡</sup> Coefficients are not reported and available upon request

**Table 5**  
**Securitization activity and loan spreads by large banks**

**Impact on loan spreads (basis points of All in Drawn Spread )**

This table presents coefficient estimates for OLS regressions estimating the impact of bank securitization activity on the price of syndicated loans by large banks. *Sec\_dum* takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. *Sec\_dum\_all* takes the value of 1 if the bank was active in the securitization market anytime between 1994 and 2008 and 0 otherwise. *Sec\_rel* is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. *Sec\_rel\_tot* is the size of banks total abs activity between 1994 and 2008 divided by average assets during this period. Large loans classified as loans larger than the median loan size.

	Small loans				Large loans			
	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
<i>Sec_dum</i>	-56.13*** (6.88)				-14.18*** (4.00)			
<i>Sec_dum_all</i>		-35.76*** (4.06)				-12.53*** (1.99)		
<i>Sec_rel</i>			-121.45*** (17.71)				-29.23*** (8.41)	
<i>Sec_rel_tot</i>				-65.02*** (7.55)				-24.24*** (3.69)
Num. of obs.	5,966	5,966	5,966	5,966	6,527	6,527	6,527	6,527
R <sup>2</sup>	31%	31%	31%	31%	41%	41%	41%	41%
<b>Control Variables<sup>†</sup></b>								
Bank characteristics								
1. Log bank size								
2. Equity capital to total assets								
3. Loan loss provision to total loans								
4. Return on assets								
5. Net loans to total assets								
6. Liquid assets to total assets								
7. Other income to total income								
Loan terms and purpose								
8. Log loan size								
9. Maturity								
10. Presence of guarantees								
11. Presence of collateral								
12. Loan purpose – general corporate use, capital structure, project finance, transport finance, corporate control and property finance.								
Borrower credit quality and business sector								
13. Credit rating – AAA, AA, A, BBB, BB, BB, CCC, CC, C, and not rated.								
14. Business Sector – contraction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport.								
Macroeconomic controls								
15. Year fixed effects – 1994 to 2008								

Notes: Robust standard errors are reported in parenthesis

\*\*\*, \*\* and \* represents significance levels at 1%, 5% and 10%, respectively

<sup>†</sup> Coefficients are not reported and available upon request

**Table 6**  
**Securitization activity and loan spreads by business cycle**

**Impact on loan spreads (basis points of All in Drawn Spread )**

This table presents coefficient estimates for OLS regressions estimating the impact of bank securitization activity on the price of syndicated loans by business cycle. *Sec\_dum* takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. *Sec\_dum\_all* takes the value of 1 if the bank was active in the securitization market anytime between 1997 and 2008 and 0 other. *Sec\_rel* is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. *Sec\_rel\_tot* is the size of banks total abs activity between 1997 and 2008 divided by average assets during this period.

	1997 - 1999				2000 - 2002				2003 - 2006				2007 - 2008			
<i>Sec_dum</i>	-16.8*** (4.49)				-10.6 (9.53)				-56.6*** (7.67)				44.1*** (12.4)			
<i>Sec_dum_all</i>	-14.4*** (2.78)				-12.4** (5.57)				-40.8*** (5.39)				-0.3 (6.30)			
<i>Sec_rel</i>	-28.9*** (8.85)				-5.3 (14.2)				-74.9*** (11.66)				53.0** (22.1)			
<i>Sec_rel_tot</i>	-17.0*** (4.79)				-8.2 (8.01)				-52.1*** (6.81)				10.61 (7.57)			
Num. of obs.	7,028	7,028	7,028	7,028	2,427	2,427	2,427	2,427	3,070	3,070	3,070	3,070	2,915	2,915	2,915	2,915
R <sup>2</sup>	29%	29%	29%	29%	44%	44%	44%	44%	42%	42%	42%	42%	33%	33%	33%	33%

**Control Variables<sup>†</sup>**

Bank characteristics		11. Presence of collateral
1. Log bank size		12. Loan purpose – general corporate use, capital structure, project finance, transport finance, corporate control and property finance.
2. Equity capital to total assets		
3. Loan loss provision to total loans	Borrower credit quality and business sector	
4. Return on assets		13. Credit rating – AAA, AA, A, BBB, BB, BB, CCC, CC, C, and not rated.
5. Net loans to total assets		14. Business Sector – contraction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport.
6. Liquid assets to total assets		
7. Other income to total income	Macroeconomic controls	
Loan terms and purpose		15. Year fixed effects – 1997 to 2008
8. Log loan size		
9. Maturity		
10. Presence of guarantees		

Notes: Robust standard errors are reported in parenthesis,

\*\*\*, \*\* and \* represents significance levels at 1%, 5% and 10%, respectively

<sup>†</sup>Coefficients are not reported and available upon request

**Table 7**  
**Securitization activity and loan spreads for borrowers with and without credit rating**

**Impact on loan spreads (basis points of All in Drawn Spread )**

This table presents coefficient estimates for OLS regressions estimating the impact of bank securitization activity on the price of syndicated loans by credit banks. *Sec\_dum* takes the value of 1 if the bank securitized any assets in the year when the loan is syndicated and 0 otherwise. *Sec\_dum\_all* takes the value of 1 if the bank was active in the securitization market anytime between 1994 and 2008 and 0 other. *Sec\_rel* is the size of banks total abs activity in the year where the loan is syndicated divided by total assets. *Sec\_rel\_tot* is the size of banks total abs activity between 1994 and 2008 divided by average assets during this period.

	Borrowers with a credit rating				Borrowers without a credit rating			
	Model I	Model II	Model III	Model IV	Model V	Model VI	Model VII	Model VIII
<i>Sec_dum</i>	-16.7*** (4.72)				-18.4*** (4.37)			
<i>Sec_dum_all</i>		-12.5*** (2.44)				-17.0*** (2.09)		
<i>Sec_rel</i>			-31.6*** (8.07)				-28.0*** (7,78)	
<i>Sec_rel_tot</i>				-22.0*** (4.21)				-18.4*** (3.29)
Num. of obs.	6,312	6,312	6,312	6,312	14,518	14,518	14,518	14,518
R <sup>2</sup>	53%	53%	53%	53%	31%	31%	31%	31%

**Control Variables<sup>‡</sup>**

**Bank characteristics**

1. Log bank size
2. Equity capital to total assets
3. Loan loss provision to total loans
4. Return on assets
5. Net loans to total assets
6. Liquid assets to total assets
7. Other income to total income

**Loan terms and purpose**

8. Log loan size
9. Maturity
10. Presence of guarantees
11. Presence of collateral
12. Loan purpose – general corporate use, capital structure, project finance, transport finance, corporate control and property finance.

**Borrower credit quality and business sector**

13. Credit rating – AAA, AA, A, BBB, BB, BB, CCC, CC, C, and not rated.
14. Business Sector – contraction and property, high-tech industry, infrastructure, population related services, state, manufacturing and transport.

**Macroeconomic controls**

15. Year fixed effects – 1994 to 2008

Notes: Robust standard errors are reported in parenthesis

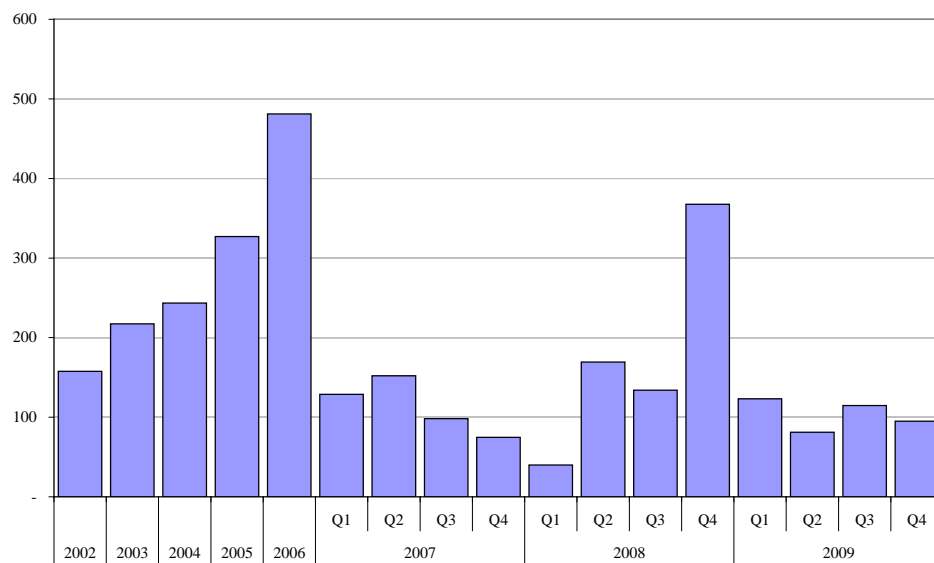
\*\*\*, \*\* and \* represents significance levels at 1%, 5% and 10%, respectively

<sup>‡</sup> Coefficients are not reported and available upon request

**Figure 1.a**

**TOTAL SECURITIZATION ISSUANCE IN EUROPE**

*(in EUR billions)*

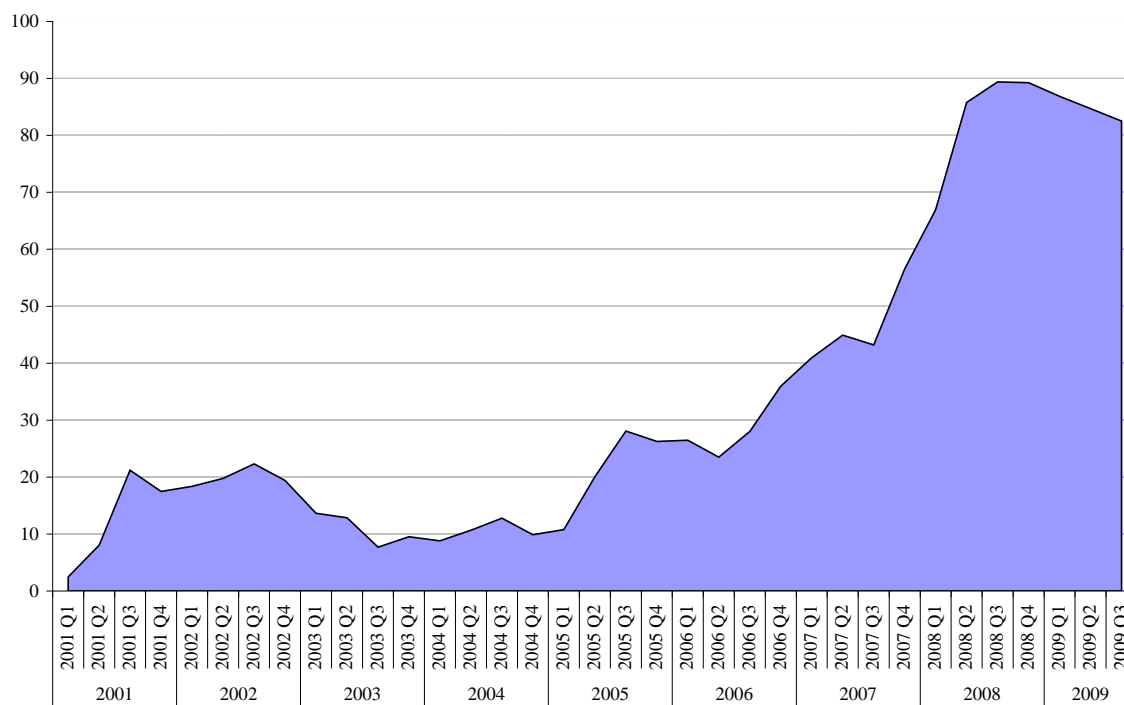


Source: European Securitization Forum.

Figure 1.b

## RETAINED SECURITISATION IN THE EURO AREA

(in percentages)



Source: European Securitization Forum.



**Table 8**  
**Correlation Matrix**

	<i>Bp over LIBOR</i>	<i>Equity to total assets</i>	<i>Loan loss reserves to total loans</i>	<i>ROA</i>	<i>Total assets</i>	<i>Net loans to total assets</i>	<i>Liquid assets to total assets</i>	<i>Other income to total income</i>	<i>Loan size</i>	<i>Maturity up to 3 years</i>
<i>Bp over LIBOR</i>	1									
<i>Equity to total assets</i>	-0.0186	1								
<i>Loan loss reserves to total loans</i>	0.0685	-0.0021	1							
<i>ROA</i>	0.0258	0.0062	-0.0243	1						
<i>Total assets</i>	-0.0606	0.0191	0.1859	-0.03	1					
<i>Net loans to total assets</i>	0.0057	0.0427	-0.5708	-0.0102	-0.198	1				
<i>Liquid assets to total assets</i>	0.0856	0.0197	-0.1255	-0.1314	-0.1047	0.2544	1			
<i>Other income to total income</i>	-0.1054	-0.0406	0.0803	0.1177	0.1129	-0.285	-0.9558	1		
<i>Loan size</i>	0.0817	0.0016	0.0142	0.0111	0.1877	0.0511	0.0492	-0.084	1	
<i>Maturity up to 3 years</i>	-0.353	0.0304	-0.0663	0.0211	0.0503	0.0967	0.0934	-0.1143	0.1383	1
<i>Maturity between 3 to 6 years</i>	0.0122	-0.0168	0.0451	0.0038	-0.0005	-0.0619	-0.0501	0.0584	-0.0344	-0.1361
<i>Maturity over 6 years</i>	-0.0908	-0.0086	-0.0356	-0.0001	-0.0306	0.0859	0.0147	-0.0252	-0.0019	0.0337
<i>Guarantee loan</i>	0.1807	0.0004	-0.0213	-0.0088	-0.002	0.0868	0.0264	-0.0367	-0.0128	-0.0911
<i>Secured Loan</i>	-0.0941	-0.0036	-0.0145	0.017	0.0112	-0.0043	-0.0592	0.0591	-0.0555	0.0358
<i>Purpose 1</i>	0.2339	0.0256	-0.0054	0.0622	-0.0356	0.05	-0.0073	-0.0095	-0.033	-0.0941
<i>Purpose 2</i>	0.234	-0.0005	-0.0022	-0.0047	0.0043	0.1094	0.0788	-0.0966	0.089	-0.0225
<i>Purpose 3</i>	-0.093	-0.0095	-0.0182	-0.001	-0.0138	0.0548	-0.0101	-0.0005	0.0268	0.1351
<i>Purpose 4</i>	-0.0508	0.0286	0.0811	-0.023	0.0148	-0.1634	0.0144	0.0144	0.0301	-0.0764
<i>Purpose 5</i>	0.0596	0.03	-0.0252	0.0221	-0.0017	0.0486	0.0193	-0.0279	-0.0339	-0.0174
<i>Business sector 1</i>	0.0067	0.0408	-0.0264	-0.012	-0.0169	0.0222	0.0228	-0.0188	-0.0301	-0.0417
<i>Business sector 2</i>	0.0466	0.0222	0.0146	-0.0057	0.0133	0.0201	0.0339	-0.0386	0.019	-0.01
<i>Business sector 3</i>	0.028	-0.0018	-0.0052	-0.0212	-0.0283	0.0426	0.0315	-0.028	0.0252	-0.0054
<i>Business sector 4</i>	0.0783	-0.0218	-0.0031	0.0173	0.0111	0.0453	0.0643	-0.0768	0.0753	-0.0431
<i>Business sector 5</i>	-0.1681	-0.0072	0.0326	-0.002	0.0277	-0.2135	-0.1158	0.1451	-0.1007	-0.0593
<i>Business sector 6</i>	0.0078	0.0691	0.0258	-0.012	-0.0128	0.0377	0.0257	-0.0311	-0.0049	-0.0296
<i>Business sector 7</i>	-0.0579	-0.0195	-0.0107	0.011	0.009	-0.0468	-0.0507	0.0559	-0.0651	0.0689
<i>Business sector 8</i>	0.0232	-0.0144	0.0037	-0.0043	-0.0373	0.0538	0.0078	-0.015	-0.0002	0.0035
<i>Business sector 9</i>	0.0538	-0.0066	0.0066	0.0038	-0.0093	0.0502	0.0401	-0.0469	0.0483	0.015
<i>Credit rating - AAA</i>	0.0835	-0.0062	-0.0418	0.0049	-0.0009	0.0805	0.015	-0.0282	0.0152	0.0978
<i>Credit rating - AA</i>	-0.0832	-0.0025	-0.0226	-0.0058	-0.0047	0.0278	0.0074	-0.0034	0.0122	0.1001
<i>Credit rating - A</i>	-0.1342	0.0023	-0.018	-0.0081	0.0127	0.0348	0.0057	-0.005	0.0114	0.1726
<i>Credit rating - BBB</i>	-0.1907	0.0228	-0.04	-0.0056	-0.0128	0.0885	0.0556	-0.0595	0.0562	0.2365
<i>Credit rating - BB</i>	-0.125	-0.002	-0.0274	-0.0179	-0.0295	0.0672	0.0307	-0.0297	0.0352	0.1175
<i>Credit rating - B</i>	0.0916	-0.029	0.0236	0.0033	-0.0443	0.0336	0.0176	-0.0138	0.004	-0.021
<i>Credit rating - CCC</i>	0.2037	-0.0156	0.0116	0.0033	-0.022	-0.0241	0.004	-0.0048	0.027	-0.0848
<i>Credit rating - CC</i>	0.0552	-0.0002	-0.017	-0.007	-0.0081	0.0291	0.0017	0.0037	0.0085	-0.0174
<i>Not rated</i>	0.0177	-0.0025	-0.0028	0.0058	0.0078	0.0091	0.0132	-0.0158	0.01	-0.011

**Table 8 (cont.)**  
**Correlation Matrix**

	<i>Maturity between 3 to 6 years</i>	<i>Maturity over 6 years</i>	<i>Guarantee loan</i>	<i>Secured Loan</i>	<i>Purpose 1</i>	<i>Purpose 2</i>	<i>Purpose 3</i>	<i>Purpose 4</i>	<i>Purpose 5</i>	<i>Business sector 1</i>
<i>Maturity between 3 to 6 years</i>	1									
<i>Maturity over 6 years</i>	-0.3386	1								
<i>Guarantee loan</i>	-0.2629	-0.4386	1							
<i>Secured Loan</i>	-0.0006	0.0079	0.0535	1						
<i>Purpose 1</i>	-0.0993	-0.1147	0.2344	0.0718	1					
<i>Purpose 2</i>	-0.0781	0	0.182	-0.0657	0.0028	1				
<i>Purpose 3</i>	0.0288	0.0867	-0.1063	-0.0015	-0.1315	-0.3629	1			
<i>Purpose 4</i>	0.0909	-0.1079	-0.2093	-0.0551	-0.0036	-0.2625	-0.3967	1		
<i>Purpose 5</i>	-0.0813	-0.1012	0.307	0.1237	0.4411	-0.1348	-0.2037	-0.1473	1	
<i>Business sector 1</i>	0.019	-0.0079	0.0259	-0.0111	-0.0058	-0.0347	-0.0524	-0.0379	-0.0195	1
<i>Business sector 2</i>	-0.0578	0.0305	0.0995	0.0079	0.0039	0.147	-0.0223	-0.056	0.0032	0.0015
<i>Business sector 3</i>	-0.0084	0.0397	0.0064	0.0185	-0.007	0.0329	0.0522	-0.0541	-0.0418	-0.0152
<i>Business sector 4</i>	-0.0491	0.0242	0.113	-0.0039	0.0372	0.1256	-0.0065	-0.1002	-0.0529	0.0172
<i>Business sector 5</i>	0.1501	-0.1268	-0.2771	-0.0726	-0.1346	-0.2511	-0.0147	0.2605	-0.1582	0.0398
<i>Business sector 6</i>	-0.0297	0.0525	-0.011	0.0171	-0.0166	0.0583	0.0253	-0.033	-0.044	-0.0091
<i>Business sector 7</i>	0.0142	0.05	-0.0202	-0.007	-0.0612	-0.076	-0.0073	-0.034	-0.001	-0.0112
<i>Business sector 8</i>	-0.0185	0.0589	-0.0133	0.0103	0.0198	0.0246	0.0519	-0.0514	-0.0173	-0.0121
<i>Business sector 9</i>	-0.0446	0.0462	0.019	-0.0157	-0.0181	0.1519	0.0142	-0.0578	-0.0695	-0.012
<i>Credit rating - AAA</i>	-0.0612	-0.0237	0.1586	0.001	0.0846	0.0076	0.0175	-0.0644	0.1298	-0.019
<i>Credit rating - AA</i>	-0.024	-0.0068	-0.0266	-0.0046	-0.0353	-0.0281	0.0292	-0.0063	-0.0231	-0.006
<i>Credit rating - A</i>	-0.0393	-0.0076	-0.0355	-0.0032	-0.0871	-0.0477	0.093	-0.0196	-0.0394	-0.0108
<i>Credit rating - BBB</i>	-0.0083	0.0366	-0.1165	0.0103	-0.1256	-0.0081	0.0867	-0.0045	-0.0614	-0.0102
<i>Credit rating - BB</i>	0.0461	0.0569	-0.1128	-0.0462	-0.1176	-0.0468	0.0553	0.0407	-0.0735	-0.0206
<i>Credit rating - B</i>	0.0721	0.0208	-0.0202	-0.0446	0.0467	0.0041	0.0596	0.0201	-0.0539	-0.0188
<i>Credit rating - CCC</i>	-0.0008	-0.0218	-0.0269	-0.0533	0.0912	-0.0033	0.0456	0.0494	-0.0578	-0.0017
<i>Credit rating - CC</i>	0.0176	-0.0108	0.0064	0.0058	0.0475	-0.0026	0.0079	-0.0056	0.0047	-0.0031
<i>Not rated</i>	0.0096	0.0077	-0.009	0.0249	0.0112	-0.0076	0.008	0.0066	-0.0043	-0.0011

**Table 8 (cont.)**  
**Correlation Matrix**

	<i>Business sector 2</i>	<i>Business sector 3</i>	<i>Business sector 4</i>	<i>Business sector 5</i>	<i>Business sector 6</i>	<i>Business sector 7</i>	<i>Business sector 8</i>	<i>Business sector 9</i>	<i>Credit rating - AAA</i>	<i>Credit rating - AA</i>	<i>Credit rating - A</i>	<i>Credit rating - BBB</i>	<i>Credit rating - BB</i>	<i>Credit rating - B</i>	<i>Credit rating - CCC</i>	<i>Credit rating - CC</i>	<i>Not rated</i>
<i>Business sector 2</i>	1																
<i>Business sector 3</i>	-0.0715	1															
<i>Business sector 4</i>	-0.1242	-0.0803	1														
<i>Business sector 5</i>	-0.2301	-0.1488	-0.2585	1													
<i>Business sector 6</i>	-0.0609	-0.0394	-0.0684	-0.1267	1												
<i>Business sector 7</i>	-0.0526	-0.034	-0.0591	-0.1095	-0.029	1											
<i>Business sector 8</i>	-0.0566	-0.0366	-0.0636	-0.1177	-0.0312	-0.0269	1										
<i>Business sector 9</i>	-0.1018	-0.0659	-0.1144	-0.2119	-0.0561	-0.0485	-0.0521	1									
<i>Credit rating - AAA</i>	-0.1104	-0.0714	-0.124	-0.2297	-0.0608	-0.0525	-0.0565	-0.1016	1								
<i>Credit rating - AA</i>	-0.0279	-0.0069	-0.0261	0.0292	-0.0154	0.0091	-0.0108	0.0462	-0.0125	1							
<i>Credit rating - A</i>	-0.0355	-0.0155	-0.0323	0.0153	0.0012	0.1242	-0.0142	0.034	-0.002	-0.0128	1						
<i>Credit rating - BBB</i>	-0.0251	0.0169	-0.0513	0.019	0.0614	0.0194	0.017	0.0197	-0.0418	-0.022	-0.0399	1					
<i>Credit rating - BB</i>	-0.009	0.0257	-0.0405	-0.0646	0.0086	0.1063	0.0223	-0.003	-0.0213	-0.0244	-0.0442	-0.076	1				
<i>Credit rating - B</i>	0.0258	0.025	0.0181	-0.0475	0.0105	0.0058	0.0042	0.0026	0.0262	-0.0223	-0.0404	-0.0695	-0.0769	1			
<i>Credit rating - CCC</i>	-0.019	0.0148	-0.0122	0.0496	-0.0233	-0.0183	0.008	-0.0039	0.0346	-0.0219	-0.0397	-0.0683	-0.0756	-0.0691	1		
<i>Credit rating - CC</i>	0.0069	-0.0043	-0.0067	-0.0215	-0.0081	-0.007	0.0055	-0.0136	0.0505	-0.0037	-0.0068	-0.0116	-0.0129	-0.0118	-0.0116	1	
<i>Not rated</i>	-0.0052	-0.0033	0.0415	-0.0107	-0.0028	-0.0025	-0.0026	-0.0047	-0.0051	-0.0013	-0.0024	-0.0041	-0.0045	-0.0041	-0.004	-0.0007	1